Pregnancy

1. Can you name the proper trimester…
    a. Implantation occurs in the uterus? **First Trimester**

    b. The embryo secretes hCG? **First Trimester**

    c. The placenta forms? **First Trimester**

    d. Organogenesis occurs and the embryo becomes a fetus? **First Trimester**

    e. The corpus luteum's progesterone secretion maintains the pregnancy? **First Trimester**

    f. hCG declines, corpus luteum dies, and the placenta secretes its own progesterone? **Second Trimester**

    g. Labor is induced by hormones and local regulators? **Third Trimester**

    h. Oxytocin, placental prostaglandins, and prolactin are produced? **Third Trimester**

Maternal Immune Tolerance

2. How is the maternal immune tolerance of the embryo and fetus maintained during pregnancy?

    - Main objective: Control mother's T-cytotoxic cells (these cells would attack the embryo/fetus)

    - Two ways:
        - Tryptophan-degrading enzymes – released by the placenta (Tc cells need tryptophan to survive)

        - Fas Ligand (FasL) – death molecule – released by the trophoblast and promotes Tc cell apoptosis

Birth Control

3. Can you list the three general types of birth control methods (and give examples of each)?

    - Prevent release of gametes (sterilization, birth control pills)

    - Prevent fertilization (abstinence, rhythm method, condom, diaphragm, spermicides, coitus interruptus)

    - Prevent implantation of embryo (IUD's, morning after pills)

4. Which birth control methods are most effective and which ones are least effective?

    - Most effective – abstinence, sterilization, chemical contraception

    - Least effective – rhythm method, coitus interruptus

Chapter 47: Animal Development

5. Can you briefly describe the three stages of embryonic development?

    - Cleavage – cell division creates a hollow ball of cells (the blastula) from the zygote
    - Gastrulation – rearranges the blastula into a three-layered embryo (the gastrula)
    - Organogenesis – interactions & movements of the three layers generate rudimentary organs (will grow into adult organs)

6. Can you describe the acrosomal reaction?

    - Binding of a sperm to a receptor on the zona pellucida induces an acrosomal reaction
    - Hyaluronic acid (HA) – surrounds the zona pellucida as part of the cumulus matrix and enhances the acrosomal reaction
    - Acrosomal reaction – the discharge of hydrolytic enzymes from the sperm acrosome when the sperm approaches or contacts an egg
    - Acrosome – a vesicle in the tip of a sperm containing hydrolytic enzymes and other proteins that help the sperm reach the egg

7. Can you describe the cortical reaction?

    - The binding of a sperm to an egg triggers changes within the egg that lead to a cortical reaction, the release of enzymes from cortical granules to the outside of the cell via exocytosis
    - Cortical granules – vesicles containing enzymes and other macromolecules located in the cortex of an egg (the region just under the plasma membrane); cortical granules undergo exocytosis during the cortical reaction
    - Cortical reaction – exocytosis of enzymes and other macromolecules from cortical granules in the egg cytoplasm during fertilization;
    - The released enzymes catalyze changes in the zona pellucida, which then functions as a slow block to polyspermy (there is no known fast block to polyspermy known to exist in mammals)
    - Slow block to polyspermy – the formation of the fertilization envelope and other changes in the egg's surface that prevent fusion of the egg with more than one sperm

8. How does egg activation occur in mammals?

    - After the egg & sperm membranes fuse, the whole sperm is taken into the egg (tail and all)
    - The centriole that acted as the basal body of the sperm's flagellum ultimately generates the mitotic spindle for the first cell division
    - Mammalian sperm & egg do not fuse immediately – the envelopes of both nuclei disperse, and the two sets of chromosomes (one set from each gamete) share a common spindle apparatus during the first mitotic division of the zygote
    - Only after this first division do the chromosomes from the two parents coexist in a true diploid nucleus with a nuclear membrane